

**WHAT IS CLAIMED IS:**

1           1. A method to control the post sinter dimensions of a multilayer ceramic  
2           substrate sintered under load comprising the steps of:

3                 providing at least one first continuous non-densifying structure (40);

4                 providing at least one personalized ceramic greensheet (10) having a local  
5           peripheral kerf area (30) and an external peripheral kerf area (20);

6                 placing said at least one first continuous non-densifying structure (40) on the local  
7           peripheral kerf area (30) of said at least one personalized ceramic greensheet (10);

8                 placing said at least one personalized ceramic greensheet (10) having said at least  
9           one first continuous non-densifying structure (40) in a stack of personalized  
10          greensheets;

11                laminating said stack of personalized ceramic greensheets to form a green ceramic  
12          laminate (100) wherein said at least one first continuous non-densifying structure (40)  
13          will at least partially control the dimensions of said green ceramic laminate (100) during  
14          lamination;

15                sintering said green ceramic laminate (100) under load to form a multilayer  
16          ceramic substrate wherein said at least one first continuous non-densifying structure  
17          (40) will at least partially control the dimensions of said multilayer ceramic substrate  
18          during sintering.

1           2. The method of claim 1 further comprising the step of post sinter sizing said  
2           multilayer ceramic substrate thereby separating said at least one first continuous non-  
3           densifying structure (40) from said multilayer ceramic substrate.

1           3. The method of claim 1 further comprising the steps of:

2                 providing at least one second continuous non-densifying structure (60);

3                 placing said at least one second continuous non-densifying structure (60) on the  
4           external peripheral kerf area (20) of said at least one personalized ceramic greensheet  
5           (10) prior to lamination wherein said at least one second continuous non-densifying  
6           structure (60) will at least partially control the dimensions of said green ceramic  
7           laminate (100) during lamination, and

8                 pre-sinter sizing said green ceramic laminate (100) thereby separating said at least  
9           one second continuous non-densifying structure (60) from said green ceramic  
10          laminate (100) prior to sintering.

1           4. The method of claim 3 wherein said first and second continuous non-densifying  
2           structure is metal, ceramic, polymer, or a combination thereof.

1           5. The method of claim 3 wherein said first and second continuous non-densifying

2 structure is a metal selected from the group consisting of molybdenum, nickel,  
3 copper, tungsten, stainless-steel and zirconia.

1 6. The method of claim 3 wherein said first and second continuous non-densifying  
2 structure has a thickness of approximately 0.0003 inch to 0.001 inch and width of  
3 greater than 0.5 millimeters.

1 7. A method to control the post sinter dimensions of a multilayer ceramic  
2 substrate which is laminated and sintered under load as a multi-up green ceramic  
3 laminate comprising the steps of:

4 providing at least one first continuous non-densifying structure (40);

5 providing at least one personalized ceramic greensheet (10) having a plurality of  
6 product samples (35) separated by a local kerf area (30) and having peripheral  
7 external kerf area (20);

8 placing said at least one first continuous non-densifying structure (40) on the local  
9 kerf area (30) of said at least one personalized ceramic greensheet (10);

10 placing said at least one personalized ceramic greensheet (10) having said at least  
11 one first continuous non-densifying structure (40) in a stack of personalized  
12 greensheets;

13 laminating said stack of personalized ceramic greensheets to form a multi-up  
14 green ceramic laminate (100) wherein said at least one first continuous non-densifying

15 structure (40) will at least partially control the dimensions of said multi-up green ceramic  
16 laminate (100) during lamination;

17 sintering said green ceramic laminate (100) under load to form a multi-up multilayer  
18 ceramic substrate wherein said at least one first continuous non-densifying structure  
19 (40) will at least partially control the dimensions of said multi-up multilayer ceramic  
20 substrate during sintering.

1 8. The method of claim 7 further comprising the step of post sinter sizing said  
2 multi-up multilayer ceramic substrate to form individual multilayer ceramic substrates  
3 and thereby separating said at least one first continuous non-densifying structure (40)  
4 from said individual multilayer ceramic substrates.

1 9. The method of claim 7 further comprising the steps of:  
2 providing at least one second continuous non-densifying structure (60);  
3 placing said at least one second continuous non-densifying structure (60) on the  
4 external peripheral kerf area (20) of said at least one personalized ceramic greensheet  
5 (10) prior to lamination wherein said at least one second continuous non-densifying  
6 structure (60) will at least partially control the dimensions of said multi-up green  
7 ceramic laminate (100) during lamination, and  
8 pre-sinter sizing said multi-up green ceramic laminate (100) thereby separating  
9 said at least one second continuous non-densifying structure (60) from said multi-up

10 green ceramic laminate (100) prior to sintering.

1 10. The method of claim 7 wherein said at least one first continuous non-densifying  
2 structure (40) further comprises tailored shapes (51) to control local distortion within  
3 said product samples (35).

1 11. The method of claim 9 wherein said first and second continuous  
2 non-densifying structure is metal, ceramic, polymer, or a combination thereof.

1 12. The method of claim 9 wherein said first and second continuous  
2 non-densifying structure is a metal selected from the group consisting of  
3 molybdenum, nickel, copper, tungsten, stainless-steel and zirconia.

1 13. The method of claim 9 wherein said first and second continuous  
2 non-densifying structure has a thickness of approximately 0.0003 inch to 0.001 inch  
3 and width of greater than 0.5 millimeters.

1 14. A multilayer ceramic laminate structure comprising:  
2 a plurality of laminated ceramic greensheets;  
3 at least one personalized ceramic greensheet (10) having a local peripheral kerf

4 area (30) and an external peripheral kerf area (20);

5 at least one first continuous non-densifying structure (40) placed on said local  
6 peripheral kerf area (30) of said at least one personalized ceramic greensheet (10).

1 15. The multilayer ceramic laminate structure of claim 14 further comprising:

2 at least one second continuous non-densifying structure (60) placed on said  
3 external peripheral kerf area (20).

1 16. The multilayer ceramic laminate structure of claim 15 wherein said first and  
2 second continuous non-densifying structure is metal, ceramic, polymer, or a  
3 combination thereof.

1 17. The multilayer ceramic laminate structure of claim 15 wherein said first and  
2 second continuous non-densifying structure is a metal selected from the group  
3 consisting of molybdenum, nickel, copper, tungsten, stainless-steel and zirconia.

1 18. The multilayer ceramic laminate structure of claim 15 wherein said first and  
2 second continuous non-densifying structure has a thickness of approximately 0.0003  
3 inch to 0.001 inch and width of greater than 0.5 millimeters.

1 19. A multi-up multilayer ceramic laminate structure comprising:

2 a plurality of laminated ceramic greensheets;

3 at least one personalized ceramic greensheet (10) having a plurality of product  
4 samples (35) separated by a local kerf area (30) and having peripheral external kerf  
5 area (20);

6 at least one first continuous non-densifying structure (40) placed on said local kerf  
7 area (30) of said at least one personalized ceramic greensheet (10).

1 20. The multi-up multilayer ceramic laminate structure of claim 19 further  
2 comprising:

3 at least one second continuous non-densifying structure (60) placed on said  
4 external peripheral kerf area (20).

1 21. The multi-up multilayer ceramic laminate structure of claim 19 wherein  
2 said at least one first continuous non-densifying structure (40) further comprises  
3 tailored shapes (51) to control local distortion within said product samples (35).

1 22. The multi-up multilayer ceramic laminate structure of claim 20 wherein said  
2 first and second continuous non-densifying structure is metal, ceramic, polymer, or a  
3 combination thereof.

1 23. The multi-up multilayer ceramic laminate structure of claim 20 wherein

2           said first and second continuous non-densifying structure is a metal selected from the  
3           group consisting of molybdenum, nickel, copper, tungsten, stainless-steel and  
4           zirconia.

1           24.       The multi-up multilayer ceramic laminate structure of claim 20 wherein said  
2           first and second continuous non-densifying structure has a thickness of approximately  
3           0.0003 inch to 0.001 inch and width of greater than 0.5 millimeters.

1           25.       The multilayer ceramic laminate structure of claim 14 further comprising:  
2                   discrete tailored shapes to control local distortion within the multilayer  
3           ceramic laminate.